

Goldstone Solar System Radar

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Strategy

This task provides for the planning, experiment design, and coordination of the data acquisition and engineering activities in support of all Goldstone planetary radar astronomy. Activities related to up-grades of the receiver systems, transmitter systems, and data processing support systems are currently intense. Also covered in this task is the hardware and software maintenance of the data processing facility (VAX 11/780 and FPS 5210) used by many of the GSSR investigators.

Progress and Accomplishments

We have supported new radar observations of Mercury, Venus, Mars, the Galilean moons, the Saturnian moon Titan, the asteroids 1977 Cuyo, 194 Prokne, 1990MF, 1990OS and comet Austin. Radar observations of Venus completed our efforts on the pole determination. New ranging measurements of Venus are improving the ephemeris that guides the Galileo spacecraft. New experiments included dual polarization VLA imaging of Titan, high resolution ranging of asteroid 1990MF, expanded coverage of Venus, Stokes parameters for Mars, real-time interferometry on Mars, and Mars CW imaging. Many of these experiments will provide new scientific insights to the radar scattering properties and surface morphology of these objects. Several of these experiments pushed the Goldstone signal processing system to new limits. The magnetic tape database is complete for all past data, but much of the new data remains to be cataloged. A SUN workstation was added to replace the current display system. Data verification programs were developed for all current data acquisition formats.

Projected Accomplishments

During the winter and spring, the Goldstone radar cone will be rebuilt to house the new 500KW transmitter providing added sensitivity for the Titan experiments. Observations of Titan using the Goldstone/VLA combination are scheduled. Observations of Mercury for relativity continue. New programmed local oscillators (PLO's) are being built to replace the twenty-year-old ones. An improved receiver systems, the up-graded X-band transmitter, and new PLO's will become available this year. Considerable effort will be required to determine if these systems meet specifications prior to the Titan tracks. Work progresses on defining a complete set of functional requirements for the radar system. Some efforts are under way to find a graceful way to replace our aging VAX's with more economical computers.